

Upper Lower Miocene Progradational (LM4 P1) Play

Marginulina ascensionensis and *Discorbis bolivarensis* biozones

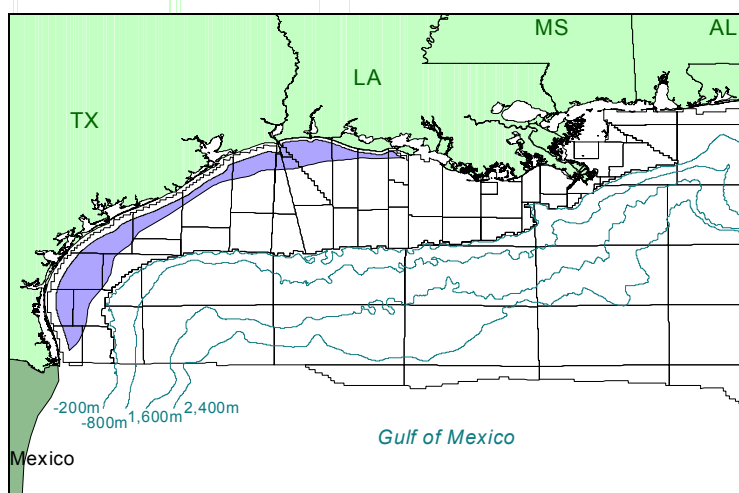


Figure 1. Play location.

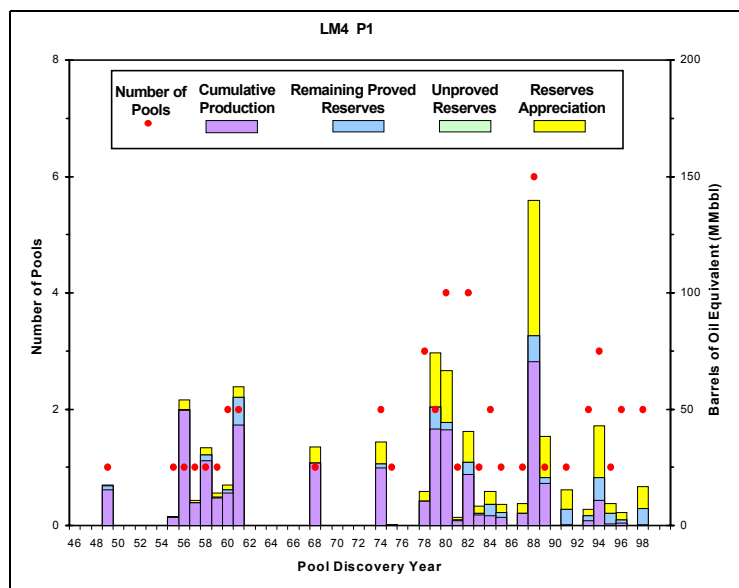


Figure 2. Exploration history graph showing reserves addition and number of pool discoveries by year.

LM4 P1 Play		Minimum	Mean	Maximum
51 Pools	175 Sands			
Water depth (feet)		29	68	156
Subsea depth (feet)		6190	9643	13022
Number of sands per pool		1	3	12
Porosity		16%	26%	35%
Water saturation		16%	29%	58%

Table 1. Pool attributes. Values are volume-weighted averages of individual reservoir attributes.

Play Description

The established Upper Lower Miocene Progradational (LM4 P1) play occurs within the *Marginulina ascensionensis* and *Discorbis bolivarensis* biozones. This play extends from the South Padre Island Area offshore Texas to the South Marsh Island Area offshore Louisiana (figure 1).

Updip and along strike, the play continues onshore into Texas and Louisiana. Downdip, the play grades into the deposits of the Upper Lower Miocene Fan 1 (LM4 F1) play.

Play Characteristics

Sediments in the LM4 P1 play represent major episodes of outbuilding of both the shelf and the slope. Sands in the play were deposited in distributary mouth bars, delta-fringes, marine bars, and channel/levee complexes. The thickest sand-dominated intervals likely represent multiple episodes of delta-lobe switching and progradation. In the Brazos and Galveston Areas, progradational sediments are relatively sand poor and represent delta-fringe deposits at the most distal edges of LM4 delta systems.

Most of the fields in the LM4 P1 play are structurally associated with normal faults. Other common structures include shale diapir-like bodies, with traps on the flanks of the shale or in sediment drape over the shale, and growth fault anticlines. Fewer hydrocarbon accumulations are associated with permeability barriers, updip pinchouts or facies changes, deep salt domes, and rotational slump blocks.

Discoveries

The LM4 P1 gas play contains total reserves of 0.047 Bbo and 4.213 Tcfg (0.796 BBOE), of which 0.032 Bbo and 2.438 Tcfg (0.465

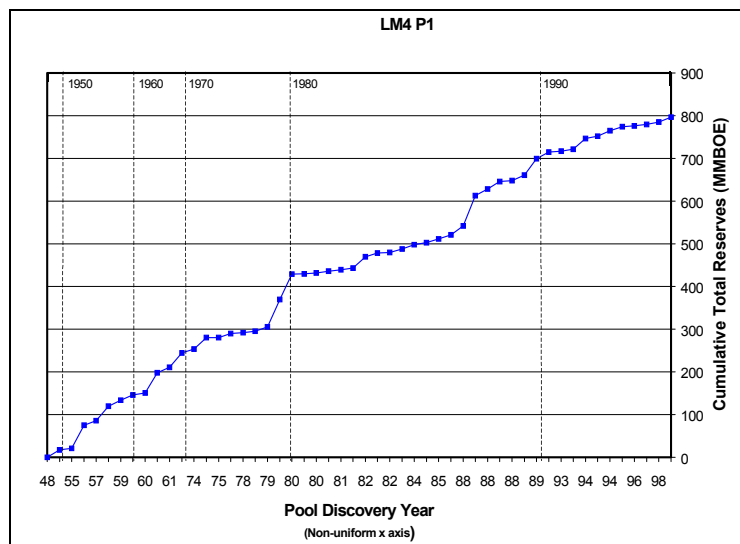


Figure 3. Plot of pools showing cumulative reserves by discovery order. Note the non-uniform x axis.

LM4 P1 Play Marginal Probability = 1.00	Number of Pools	Oil (Bbbl)	Gas (Tcf)	BOE (Bbbl)
Reserves				
Original proved	51	0.037	2.914	0.555
Cumulative production	—	0.032	2.438	0.465
Remaining proved	—	0.005	0.476	0.090
Unproved	0	0.000	0.000	0.000
Appreciation (P & U)	—	0.010	1.298	0.241
Undiscovered Conventionally Recoverable Resources				
95th percentile	—	0.006	0.731	0.138
Mean	21	0.010	0.920	0.174
5th percentile	—	0.016	1.122	0.212
Total Endowment				
95th percentile	—	0.053	4.944	0.934
Mean	72	0.057	5.133	0.970
5th percentile	—	0.063	5.335	1.008

Table 2. Assessment results for reserves, undiscovered conventionally recoverable resources, and total endowment.

BBOE) have been produced. The play contains 175 producible sands in 51 pools (table 1; refer to the Methodology section for a discussion of reservoirs, sands, and pools). The first reserves in the play were discovered in the West Cameron 45 field in 1949 (figure 2). Maximum yearly total reserves of 140 MMBOE were added in 1988 with the discovery of six pools. The largest pool in the play, Matagorda Island 604, was also discovered in 1988 and contains 71 MMBOE in total reserves. Ninety-seven percent of the play's cumulative production and 88 percent of the play's total reserves come from pools discovered before 1990. The most recent discoveries, prior to this study's cutoff date of January 1, 1999, were in 1998.

The 51 discovered pools contain 334 reservoirs, of which 315 are nonassociated gas, 11 are undersaturated oil, and 8 are saturated oil. Cumulative production has consisted of 93 percent gas and 7 percent oil.

Assessment Results

The marginal probability of hydrocarbons for the LM4 P1 play is 1.00. The play contains a mean total endowment of 0.057 Bbo and 5.133 Tcfg (0.970 BBOE) (table 2). Forty-eight percent of this BOE mean total endowment has been produced.

Assessment results indicate that undiscovered conventionally recoverable resources (UCRR) have a range of 0.006 to 0.016 Bbo and 0.731 to 1.122 Tcfg at the 95th and 5th percentiles, respectively (figure 4). Mean UCRR are estimated at 0.010 Bbo and 0.920 Tcfg (0.174 BBOE). These undiscovered resources might occur in as many as 21 pools. The largest undiscovered pool, with a mean size of 29 MMBOE, is forecast as the 9th largest pool in the play (figure 5). The forecast places the next four largest undiscovered pools in positions 14, 17, 20, and 29 on the pool rank plot. For all the undiscovered pools in the LM4 P1 play, the mean mean size is 8 MMBOE compared with the 16

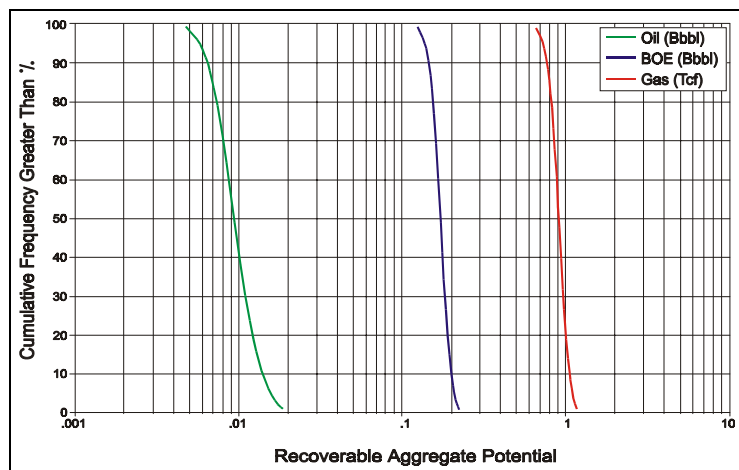


Figure 4. Cumulative probability distribution for undiscovered conventionally recoverable resources.

MMBOE mean size of the discovered pools. The mean mean size for all pools, including both discovered and undiscovered, is 13 MMBOE.

The LM4 P1 play lies within an extensively drilled area in the Gulf of Mexico Region. Exploration potential is limited to subtle traps in and around existing fields, deeper sections within existing fields, or in areas downdip of existing pools where wells may not have penetrated deeply enough to reach the LM4 P1 section. BOE mean UCRR contribute 18 percent to the play's BOE mean total endowment.

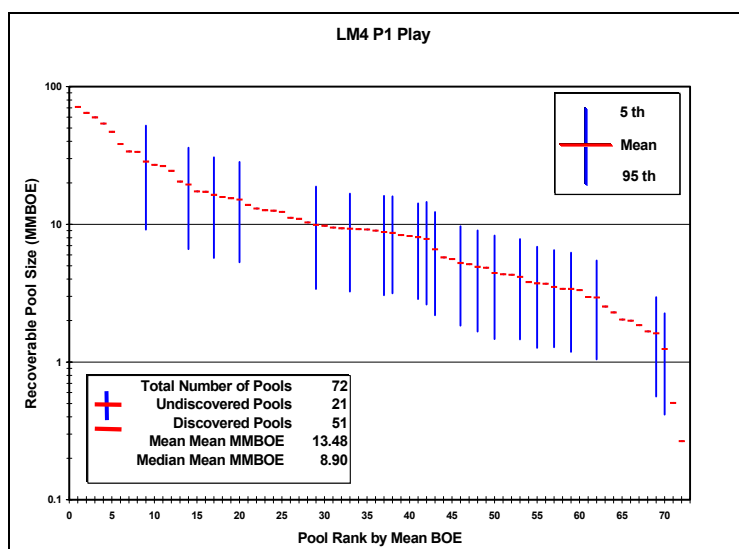


Figure 5. Pool rank plot showing the number of discovered pools (red lines) and the number of pools forecast as remaining to be discovered (blue bars).